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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/733,984	12/11/2003	Hui-Min Mao	10113311	2073

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QUINTERO LAW OFFICE
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EXAMINER

MONDT, JOHANNES P

ART UNIT	PAPER NUMBER
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3663

DATE MAILED: 07/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/733,984

Applicant(s)

MAO ET AL.

Examiner

Johannes P. Mondt

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 23-27 is/are pending in the application.
- 4a) Of the above claim(s) 27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 23, 25 and 26 is/are rejected.
- 7) ☒ Claim(s) 24 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination ("RCE") under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/10/06 has been entered.

Response to Amendment

Amendment filed 6/10/06 with said RCE forms the basis for this office action. In said Amendment applicant substantially amended claims 23-27 through substantial amendment of claim 23. Claims 23-26 are the remaining elected claims, claim 27 having been withdrawn. Comments on Remarks submitted with said Amendment are included below under 'Response to Arguments'.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. **Claim 23** is rejected under 35 U.S.C. 103(a) as being unpatentable over Tu (6,100,138) (as cited in previous office action), in view of Blosser et al (6,979,640 B1) and Tsai et al (US 2004/0021473 A1).

Tu teaches a structure for a bit line contact hole (col. 4, l. 13-15) comprising: a substrate 100; a transistor (with gate 104/106 and source/drain regions 115) (col. 3, l. 62 – col. 4, l. 3), disposed on the substrate (Figures 11A,B), comprising a gate layer 104/106 ((loc.cit.) covered by a first insulating layer 102 (col. 3, l. 67 – col. 4, l. 1) and comprising a doped region 115 (source/drain regions; see col. 3, l. 62-66); an inner landing pad 120a (col. 4, l. 25-54), disposed on the doped region 115 and parts of the transistor (e.g., on the gate stack 104/106 and the gate insulating layer 102) (Figure 11A), comprising a polysilicon layer (col. 4, l. 41-43);

a passivation layer 135a (col. 4, 56-59) *capable* of serving as a barrier layer (col. 4, l. 55-58), disposed on the inner landing pad, the transistor, and the substrate;

a second insulating layer 160 (Figures 3A; col. 4, l. 55-64), disposed on the passivation layer (Figures 11A,B), having a flat surface (cf. Figure 11A,B: straight horizontal lower main surface of portion of 270 protruding out of contact plug) on the passivation layer (Figures 11A,B);

a contact plug, i.e., 240/260 filled with 270 material laterally between 240 and hence higher and in contact with, - hence “on” said second insulating layer 160 (Figures 11A,B) and the passivation layer (Figures 11A,B) and contacted with the inner landing pad 120 (Figure 11A), electrically connecting with the inner landing pad (through 240 abutting 120); and

an interconnected landing pad on the contact plug (concave portions of 270 extend laterally outward from the contact plug beyond the boundaries of 240).

Tu does not necessarily teach the second insulating layer to comprise doped materials. However, it would have been obvious to include boro-phosphosilicate (BPSG), - which comprises doped materials boron and phosphor, as a material selection for said second insulating layer 160 because said second insulation layer 160 is a "nitride capping layer serving as hard mask" (see Tu, col. 5, l. 44-46), while it would have been obvious to select either BPSG or nitride as material for capping layer in view of Blosser et al, who, in a patent on interconnect structures for inter alia memory devices, hence analogous art, teach that for capping layers nitride and BPSG are equivalent material selections (col. 4, l. 62 – col. 5, l. 25). Furthermore, in view of Tsai et al, drawn to a patent application on MOS transistor based memory devices (abstract and [0004]), hence analogous art, for hard masks nitride and BPSG are equivalent material selections ([0009]).

Applicant is reminded in this regard that it has been held that mere selection of known materials generally understood to be suitable to make a device, the selection of the particular material being on the basis of suitability for the intended use, would be entirely obvious. In re Leshin 125 USPQ 416.

Finally, the limitation that the passivation layer is "serving as a diffusion barrier" constitutes functional language. In reference to the "serving as a barrier layer" intended use and other types of functional language must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the

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claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963).

1. **Claims 25-26** are rejected under 35 U.S.C. 103(a) as being unpatentable over Tu, Blosser et al and Tsai et al as applied to claim 23 above, in view of Hartner et al (6,043,529).

As detailed above, claim 23 is unpatentable over Tu in view of Blosser et al and Tsai et al. Tu also teaches, the passivation layer 135a to comprise a nitride layer. Tu does not necessarily teach said nitride layer to be a silicon nitride layer. However, it would have been obvious select silicon nitride in view of Hartner et al, who, in a patent on a storage element for a semiconductor memory configuration (col. 1), hence analogous art, teach the selection of a silicon nitride layer 4 (col. 5, l. 18) between a lower electrode 5 (col. 5, l. 12; similar to lower electrode 240 in Tu) and a silicon oxide comprising dielectric layer 2 (col. 5, l. 1; similar to 130 in Tu) (see Figures 1-2 and col. 4, l. 65 – col., 5, l. 67). Therefore, Hartner et al show that silicon nitride has been recognized in the prior art to be a suitable material for the structural component 135a in Tu. It has been held that mere selection of known materials generally understood to be suitable to make a device, the selection of the particular material being on the basis of suitability for the intended use, would be entirely obvious. In re Leshin 125 USPQ 416.

On claim 26: the thickness, i.e., between 15 and 50 nm, i.e., between about 150 and 500 Å, of the passivation layer 135a in Tu (see col. 4, l. 60-62) meets the claim limitation

because "about" means "approximately". For instance, 140 Å is both about 130 and about 150 Å, and hence included in both the range as claimed and the range found in the prior art.

Allowable Subject Matter

2. **Claim 24** is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: strictly within the context of the invention defined by claim 23 the thickness of the inner landing pad found in the prior art, Tu, is significantly greater than the claimed 110-130 Angstrom, being a sizable fraction of the thickness of layer 130 (2000 – 4000 Angstrom); prior art wherein the inner landing pad is much thinner exists, see Murai (5,410,183) as cited in the previous office action, but then the contact plug is not contacted with the inner landing pad as claimed by amendment.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Johannes P. Mondt whose telephone number is 571-272-1919. The examiner can normally be reached on 8:00 - 18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack W. Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JPM
July 10, 2006

Patent Examiner:

A handwritten signature in black ink, appearing to read 'J. Mondt', with a stylized flourish at the end.

Johannes Mondt (Art Unit: 3663)